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<p>(54) Title: A METHOD FOR FORMING A STERILE CONTAINER AND A CONTAINER WITH AN APERTURE WHICH IS SHUT WITH A CLOSURE</p> <p>(57) Abstract</p> <p>The invention relates to a method for forming a container, particularly a sterile container, which container comprises a container body (1) of a cardborad-based material and end parts (2, 3) attached to/formed at the ends thereof, in which method a container body (1) is constructed, end parts (2, 3) are formed at/attached to the container body (1), a product to be packed is fed into the container body (1) through an aperture (5) at either end thereof, the aperture (5) is shut with a closure (4). To enable easy shutting of the closure with a simple apparatus mechanism effecting the closing in addition to the fact that the possibility is offered to simultaneously sterilize the container and the closure with uncomplicated equipment, the method of the invention is characterized in that the closure (4) is secured to the end part (2) prior to the feeding of the product to be packed into the container body (1). The invention also relates to a container.</p> <p>The diagram illustrates a vertical container body (1) made of a flexible material. It features two end parts, (2) and (3), which are attached to the top and bottom edges of the body respectively. An aperture (5) is located near the top edge. A closure (4) is shown being secured to the end part (2) at the top. The body (1) has several horizontal dashed lines indicating its internal structure or compartments. Labels 1 through 7 are present: 1 points to the side of the body; 2 points to the top end part; 3 points to the bottom end part; 4 points to the closure; 5 points to the top edge near the aperture; and 7 points to one of the internal horizontal lines.</p>			

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A method for forming a sterile container and a container with an aperture which is shut with a closure.

The invention relates to a method for forming a container, particularly a sterile container, which
5 container comprises a container body of a cardboard-based material and end parts attached to/formed at the ends thereof, in which method a container body is constructed, end parts are formed at/attached to the
10 container body, a product to be packed is fed into the container body through an aperture at either end thereof and the aperture is shut with a closure. The invention also relates to a container for liquids, particularly beverages, which container comprises a container body of a cardboard-based material and end
15 parts attached to/formed at the ends thereof.

Containers of the above described type, which, however, are not necessarily sterile, are known from Finnish Published Specification No. 65,962 and Finnish Patent Application No. 843665. When these containers are formed, one proceeds so that subsequent to the forming of the container body one end thereof is first closed and thereafter the container body is filled with the product to be packed, such as a liquid, possibly after the sterilization of the container body. Thereafter also the other end of the container body is closed with a lid which is most commonly provided with an openable drinking or emptying aperture. When this kind of container is being formed, the closing of the upper end of the container body after the filling of the container will present a problem. Then it should namely be possible to secure the lids to be affixed to the container bodies tightly to said container bodies without the product to be packed penetrating, e.g. spilling into, the seam to be formed. If namely the container body has
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become wet in its seam region, it is in practice difficult to raise the sealing temperatures and pressure with a container of the described type, particularly if the lid is of an insulating material such as cardboard, so high that liquid and oxygen proof seams could be reliably produced. The result is in any case a definite decrease in the production rate and deterioration of the quality of the product to be packed. Another problem in the filling method of a container of this kind will arise if one desires to make the container sterile. Then a sterilizing treatment corresponding to that performed on the container body has to be separately performed on the lid material. Furthermore, the steps pertaining to the joining of the lid material and the container body, such as the punching of the lid, forming, dust removal, insertion of the lid and other mechanical displacing movements, have to be performed in a sterile space or a space immediately adjoining such a space. Consequently, the construction of the packaging line becomes expensive.

Swiss Patent No. 580512 teaches a solution the purpose of which is to eliminate the above-stated problems. The publication discloses a solution wherein the end parts of the container are secured to the container body prior to the filling of the container, which is performed through a passage in the lid. The advantage with this solution is that the end parts can be secured to the container body so that the joint is liquid and air tight. The passage may be shut for instance with a separate closure, as has been disclosed in the patent. With a separate closure, the passage can be most securely shut. Yet the problem remains how the closing is to be effected in practice: an apparatus mechanism attending to the closing, constructed immediately in connection with

the filling will become uneconomical and particularly in a case where a sterile container is desired. Since in a sterile container also the closure must be sterile, it has been contemplated that the separate sterilizing equipment attending to the sterilization of the closure and the apparatus mechanism attending to the closing must be constructed within an aseptic space. However, in practice a complex apparatus unit of this kind does not warrant absolutely certain sterility. The solution according to Swiss Patent No. 580512 also has the problem that the weakening lines in the end part of the container must be torn open prior to the filling of the container to form a filling aperture, which in a case where the end parts are of a cardboard-based material results in that the absolute sterility of the container is lost.

The purpose of the present invention is to present a method for forming a container wherein the above-stated problems have been essentially eliminated, and thus a method for forming a container has been created which can be automated in a considerably simpler way than heretofore. The method according to the invention is mainly characterized in that the closure is secured to the end part before the product to be packed is fed into the container body.

The method of the invention is particularly well suited to forming a sterilized container, whereby it further includes, prior to the filling of the container body with a product to be packed, feeding of a sterilizing agent into the container body through said aperture and sterilizing of the closure, and removal of the sterilizing agent and drying of the container body and closure. It is thereby particularly advantageous to perform the sterilization of the closure simultaneously with the sterilization

of the container body. The advantageous embodiments of the method of the invention have been presented in the appended claims 2 to 7.

The container according to the invention is characterized in that an aperture has been formed in one of the end parts, and prior to the filling of the container a closure which leaves the aperture open has been attached to the proximity of the aperture, the size of said closure being sufficient to shut the aperture. Advantageously, the end part including the aperture is of a cardboard-based material, in which case the cardboard at the edge of the aperture is covered with a plastic coating. The advantageous embodiments of the container of the invention have been presented in the appended claims 10 and 11.

The invention is based on the idea of forming the closure in the end part of the container prior to the filling of the container, whereby a very simple apparatus mechanism effecting the closing may be used, in addition to the fact that the possibility is offered to attend to the sterilization of the container as well as the closure in the same sterilizing treatment and even with the same sterilizing equipment. By disposing the closure for the aperture onto the container exterior of the aseptic space prior to the sterilization and filling, a filling process is created which is very simple and economical in its stages of operation.

In the method of the invention, the aperture in one end part of the container, which aperture may be either a drinking or an emptying aperture or some other aperture contemplated specifically for this purpose, is used both for supplying the product to be packed into the container body and possibly for supplying the sterilizing agent into the container body,

emptying of the container body of sterilizing agent and interior drying of the container body. Both ends of the container are formed at/attached to the dry container body prior to the filling thereof, in which
5 case the seams thereof can be easily made tight and entrance of the product to be packed between the lid and the container body when these are sealed together is avoided. When a sterile container is produced, the container body and its end parts are sterilized
10 simultaneously. On account of the fact that the sterilizing agent is fed into a relatively closed environment, the use thereof can be made more effective. Also the hot air used in the drying can be better utilized. When the aperture in the end part is closed
15 after the filling, no problems can arise from spilling of the content of the container, which could impair the tightness of the seal. The closure flap may be e.g. of plastic-aluminium laminate and it can be very simply heat-sealed to the end part. The container is alternatively suitable for sterilization by
20 irradiation.

The following is a more detailed description of the method of the invention for forming a liquid container by means of an exemplary embodiment particularly contemplated as a liquid container, with reference to the accompanying drawing wherein
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Figures 1, 3, 5, 6, 7 and 8 illustrate the different steps in the process according to the invention,

30 Figure 2 shows a cross-section of the end part in the proximity of an aperture in the end part,

Figure 4 illustrates the container prior to its filling, and

35 Figure 9 illustrates an exemplary container as produced.

Figure 1 shows a cylindrical container body 1 manufactured e.g. of a cardboard-based and plastic-coated material, having at least one side seam 8 formed therein which, when made with a sufficient overlap, ensures the tightness of the container body. An end part 2 having a drinking aperture 5 is shown in Figure 1 to be attached to one end of this container body 1. This end part 2, which has also been manufactured of a plastic-coated, cardboard-based material, has been pressed from an annular piece of material in the shape and size of the end of the container body. Thereby the edges 9 thereof have been bent by crimping substantially perpendicularly to the plane of the end part 2. This end part 2 is attached to the container body 1 in a conventional manner so that the end part 2 is introduced to some extent into the container body 1 and thereafter the outer edge of the container body is bent on top of the edges 9 of the end part 2 by crimping and heat sealed in this position. Such an attachment is apparent from Figure 2 on the one hand and also from the cross-sections shown in Figures 3 to 6.

Figure 2 shows a section of the end part 2 of the container in the proximity of the aperture 5. It is seen from the figure that at the edge of the aperture 5 the cardboard 10 is completely covered with a liquid and air proof coating, a plastic coating 11 serving as said coating. Instead of a plastic coating, some other liquid and air tight coating may be used.

Figure 3 shows the second step in the method of the invention, wherein the other end part 3 is attached to the container body 1. The attachment of this end part takes place fully similarly as that of the end part 2.

Figure 4 shows a container according to the invention, wherein a separate closure flap 4 has been disposed adjacent the filling aperture 5 in an upright position.

5 Figure 5 shows a step wherein a sterilizing agent 6 is fed into the container body 1 through an aperture 5 in the end part 2 thereof and to the closure flap 4. This sterilizing agent, which very often is hydrogen peroxide, can be fed either as a solution or by droplet spraying or as vapour. If the sterilizing agent is fed as a solution, it must be poured out in the next step. If, on the other hand, the sterilizing agent is fed as droplet spraying or as vapour, no pouring out need to be carried out, but
10 the sterilizing agent can be removed in connection
15 with the interior drying of the container body.

This drying of the container body 1 has been illustrated in Figure 6. In this step, hot air is blown into the container body 1 through the aperture 20 5 in the end part 2 thereof and to the closure flap 4. This is a very advantageous way to dry the closure flap and on the one hand to dry the container body from within as well as to remove the used sterilizing agent from within the container body. If namely hydrogen peroxide has been used as a sterilizing agent, when heated sufficiently by the action of the hot air fed in it will break down into water and oxygen which are entrained in the stream of hot air exiting from the container body in gaseous form. Both when the
25 sterilizing agent is supplied in accordance with Figure 5 and when the container body is dried from within in accordance with Figure 6, there is in practice advantage of the fact that also the upper end of the container body 1 is closed with a lid 2. Thereby
30 the sterilizing agent and the hot air, respectively,
35

are fed into a relatively closed space wherein they can act efficiently without escaping into the environment. In this way, the amount of both the sterilizing agent used and also the hot air needed for the drying can be diminished in comparison with a situation where the container body would be open at the upper end.

In the process step according to Figure 7, the liquid to be packed is fed into the sterilized container body through the aperture 5 in the end part 2 of the container body 1. In this way, the liquid to be packed 7 which is fed into the container body can no longer impair the seams between the container body 1 and the end parts 2 and 3 thereof.

Figure 8 shows the last step in the method of the invention, wherein the aperture in the end part 2 of the container body is covered with a closure flap 4. This closure flap may most preferably be of plastic-aluminium laminate which thus has a meltable plastic surface. When the closure flap 4 is pressed at a sufficiently high temperature, which may be at least 110°C, onto the edges of the aperture in the end part 2 of the container body 1, also having a layer of meltable plastic material, the closure flap 4 can be heat sealed very effectively and reliably to the surface of the end part 2. As has been shown in Figure 9, the closure flap 4 has been so shaped that it has a projection facilitating the tearing open thereof. If one wishes to use the aperture 5 also as a drinking or emptying aperture in this way, it is advantageous to use as the plastic material of the closure flap so called peelable polyethylene, in which case it can be relatively easily removed from the surface of the end part 2. As was already stated in the foregoing, the aperture 5 may also be an aper-

ture specifically contemplated for carrying out the method of the invention, in which case the intention is not to use it later for opening the container. Then the shape of the closure flap is naturally different, and also the material thereof may be selected differently. Thereby one of the end parts of the container body naturally includes suitable means for opening the container already prior to the attachment thereof to the container body 1.

In the above, the method according to the invention for forming a container has only been illustrated on the basis of one exemplary embodiment specifically pertaining to a liquid container and it is to be understood that the method of the invention can be implemented irrespective of the nature of the product to be packed, the shape of the container body and the location or shape of the filling aperture in either end part of the container body. Thus also the closing of the ends of the container body may vary, and e.g. in connection with a rectangular container body closing by means of flattening will naturally also come into question for one end. It is advantageous to make the aperture in the end part material prior to the attachment of the end part to the container body particularly when one wishes to protect the edges of the aperture with a liquid and gas impervious layer. It can be contemplated that instead of an aperture, the forming of an opening is carried out for the part of substantial passages only.

C l a i m s :

1. A method for forming a container, particularly a sterile container, which comprises a container body (1) of a cardboard-based material and end parts (2, 3) attached to/formed at the ends thereof,
5 in which method
 - a) a container body (1) is constructed,
 - b) end parts (2, 3) are formed at/attached to
10 the container body (1),
 - c) a product to be packed (7) is fed into the container body (1) through an aperture (5) at either end thereof,
 - d) the aperture (5) is shut with a closure (4),
15 characterized in that
 - e) the closure (4) is secured to the end part (2) before the product to be packed (7) is fed into the container body (1).
2. A method as claimed in claim 1, characterized in that it further comprises, prior to the filling of the container body (1) with the product to be packed (7),
20 feeding of a sterilizing agent (6) into the container body through said aperture (5) and sterilizing of the closure (4), and removal of the sterilizing agent and drying of the container body and closure.
25
3. A method as claimed in claim 2, characterized in that the closure (4) is sterilized simultaneously with the sterilization of the container body (1).
30
4. A method as claimed in claim 2 or 3, characterized in that the sterilizing agent (6) is fed into the container body (1) as drop-
35 let spraying or as vapour and that the sterilizing

agent is removed and the container body and closure (4) are dried from within by blowing hot air into the container body through said aperture (5).

5. A method as claimed in claim 1, characterized in that it further comprises, prior to the filling of the container body (1) with the product to be packed (7), sterilization of the container body (1) and closure (4) by irradiation.

10. A method as claimed in any one of the preceding claims 2 to 5, characterized in that a cardboard-based material is used as an end part (2) including an aperture (5), the cardboard at the edge of said aperture being covered with a plastic coating.

15. A method as claimed in claim 1, characterized in that a closure flap (4) is employed as the closure.

20. A method as claimed in claim 1, characterized in that the forming of the aperture (5) in the end part is carried out at least for the part of substantial passages prior to the securing of the end part to the container body (1).

25. A container for liquids, particularly beverages, comprising a container body (1) of a cardboard-based material and end parts (2, 3) attached to/formed at the ends thereof, characterized in that an aperture (5) has been provided in one of the end parts, and prior to the filling of the container a closure (4) which leaves the aperture open has been attached to the proximity of the aperture, the size of said closure being sufficient to shut the aperture.

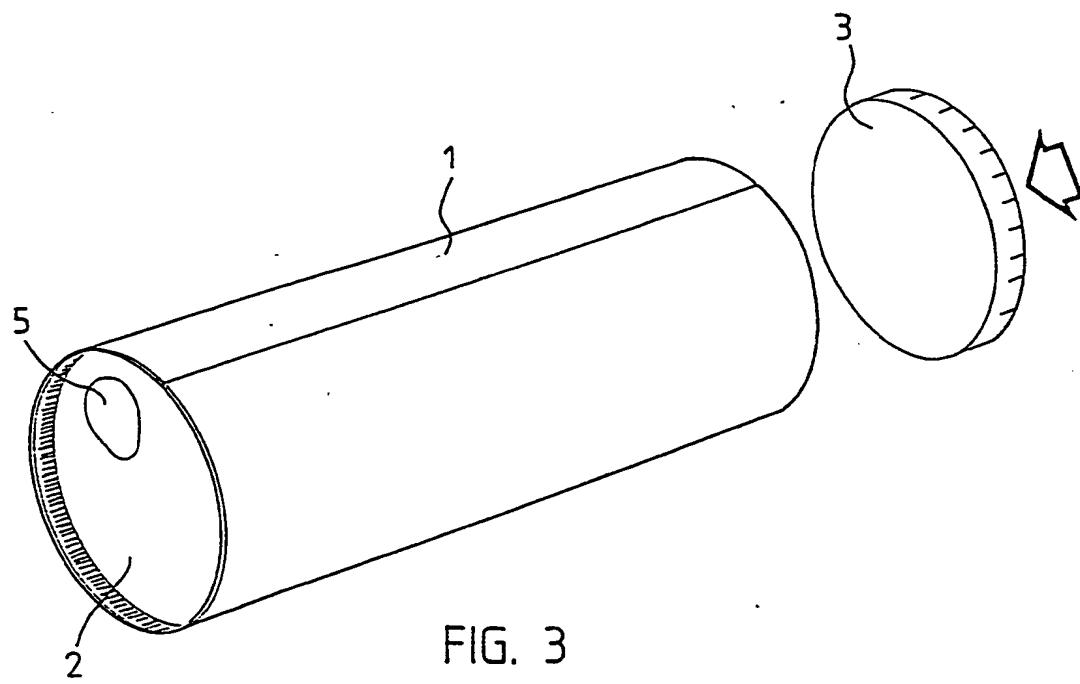
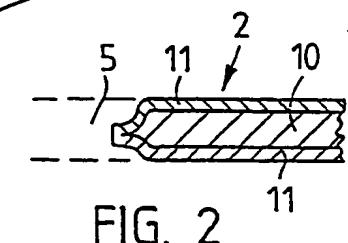
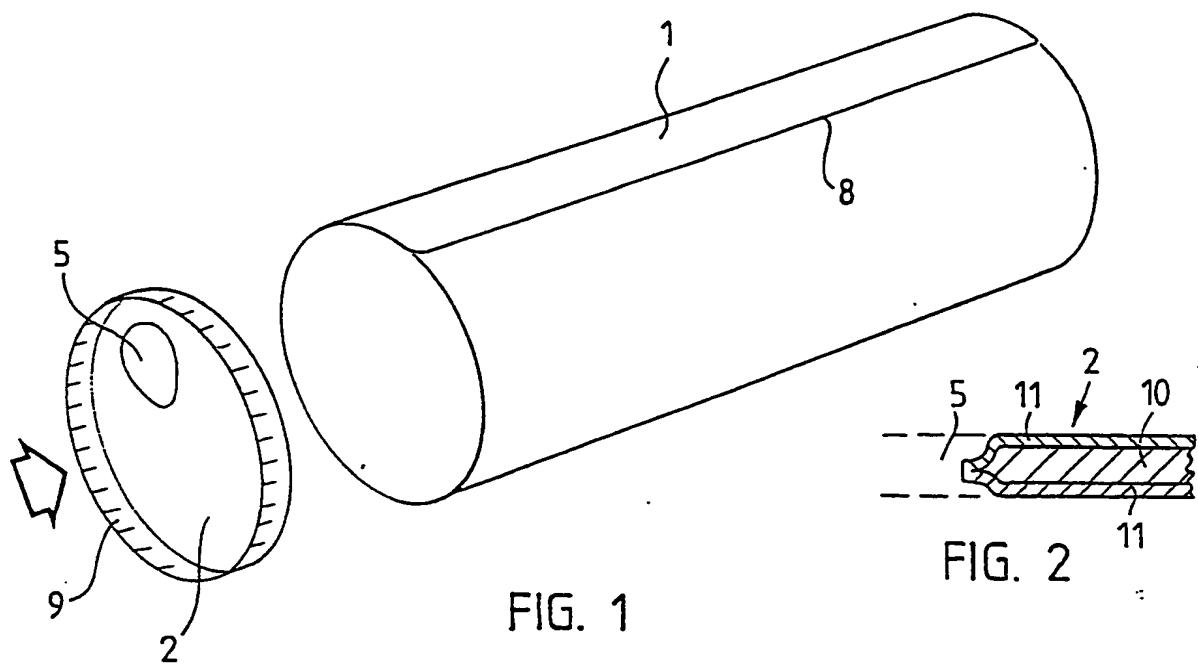
30. A container as claimed in claim 9, characterized in that the end part (2) including the aperture (5) is of a cardboard-based

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material, the cardboard (10) at the edge of the aperture being covered with a plastic coating (11).

11. A container as claimed in claim 9,
characterized in that the closure attached to the proximity of the aperture (5) is constituted by a closure flap (4).

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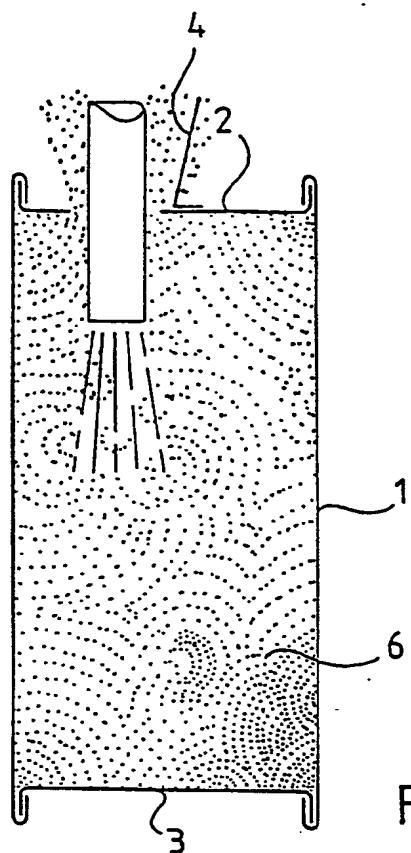


FIG. 5

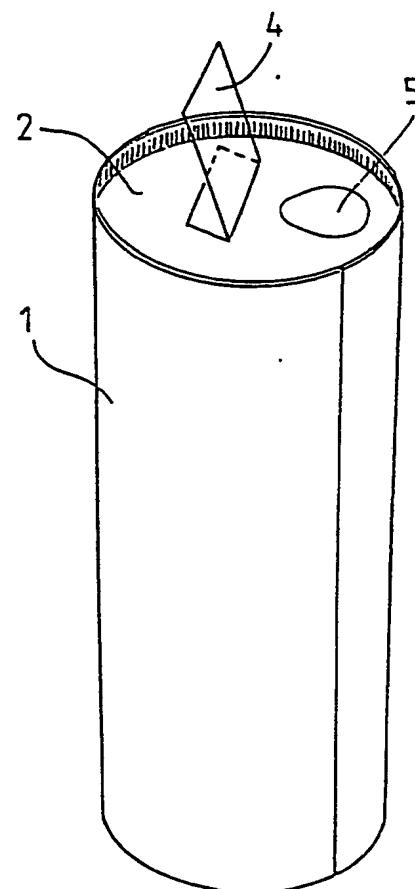


FIG. 4

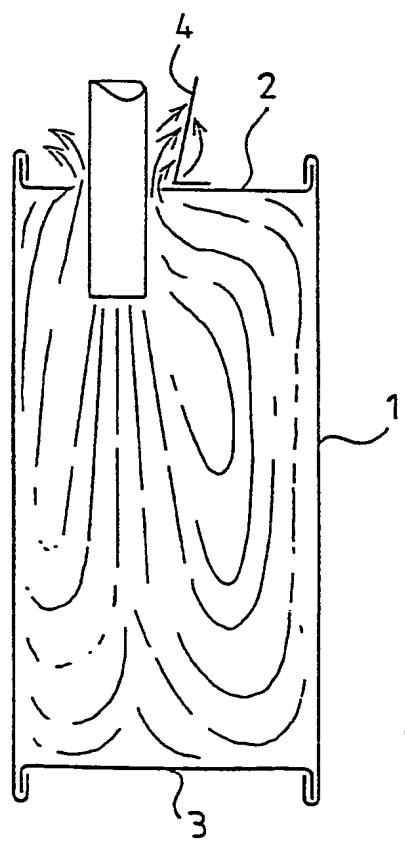


FIG. 6

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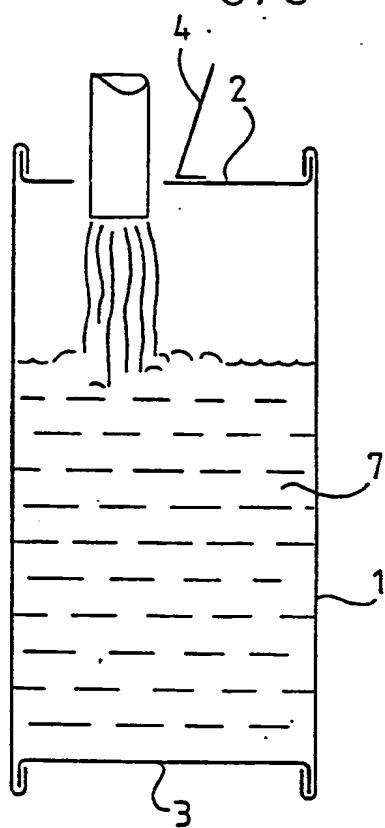


FIG. 7

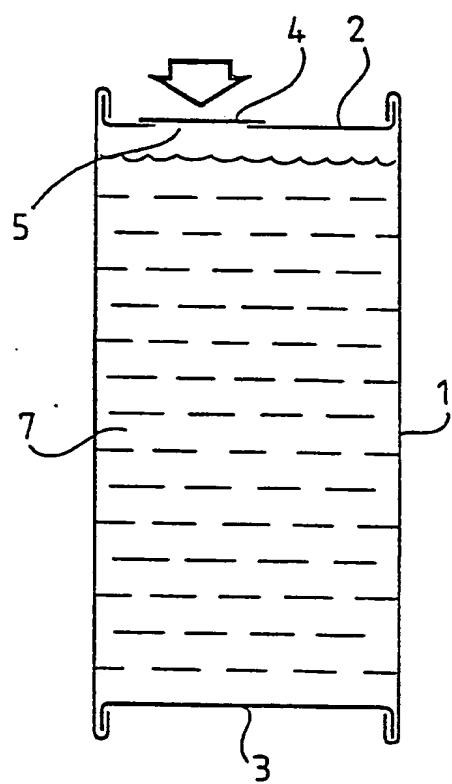


FIG. 8

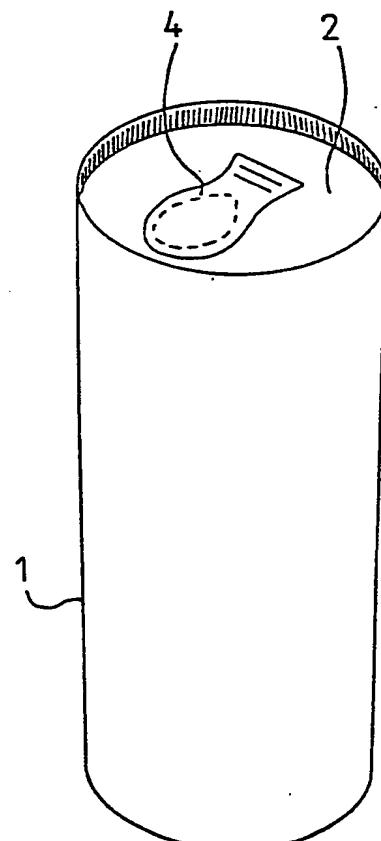


FIG. 9

INTERNATIONAL SEARCH REPORT

International Application No PCT/FI 90/00181

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶		
According to International Patent Classification (IPC) or to both National Classification and IPC IPC5: B 65 B 55/06, 3/02		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
IPC5	B 65 B	
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III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹		
Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
X	US, A, 3943682 (RAUSING) 16 March 1976, see column 3, line 55 - line 61	1-3,5- 11 4
Y	--	
X	US, A, 2355073 (J.M. HOTHERSALL) 8 August 1944, see the whole document	1-3,5- 11 4
Y	--	
X	DK, B, 122801 (SCHMALBACH-LUBECA-WERKE AG) 17 April 1972, see page 2, line 9 - line 20	1-3,5-8
Y	--	
Y	FI, B, 48558 (EX-CELL-O CORPORATION) 27 August 1969, see the whole document	4

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IV. CERTIFICATION		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
18th October 1990	1990 -10- 19	
International Searching Authority	Signature of Authorized Officer	
SWEDISH PATENT OFFICE	Yvonne Siösteen	

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO.PCT/FI 90/00181**

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the Swedish Patent Office EDP file on **90-09-27**.
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 3943682	76-03-16	AU-D- 7008174 CA-A- 1018912 CH-A- 580512 DE-A-B-C 2428355 FR-A-B- 2233229 GB-A- 1446371 JP-C- 1209370 JP-A- 50036295 JP-B- 58039690 NL-A- 7407931 SE-B-C- 383625 SE-A- 7308364	75-12-18 77-10-11 76-10-15 75-01-16 75-01-10 76-08-18 84-05-29 75-04-05 83-08-31 74-12-17 76-03-22 74-12-16
US-A- 2355073	44-08-08	NONE	
DK-B- 122801	72-04-17	NONE	
FI-B- 48558	69-08-27	NONE	